

Exhibit 4

Second Supplemental Reply Report of
Hal J. Singer, Ph.D.
(May 28, 2018)

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEVADA**

IN RE:)	Case No.: 2:15-cv-01045-RFB-(PAL)
)	
Cung Le, Nathan Quarry, Jon Fitch, Brandon Vera,)	CLASS ACTION
Luis Javier Vazquez, and Kyle Kingsbury,)	
on behalf of themselves and all others similarly)	
situated,)	
)	
Plaintiffs,)	
)	
vs.)	
)	SECOND SUPPLEMENTAL REPLY
)	REPORT OF HAL J. SINGER, PH.D.
Zuffa, LLC, d/b/a Ultimate Fighting Championship)	
and UFC,)	
)	
Defendant.)	

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INTRODUCTION

1. I have been asked by counsel for Plaintiffs to respond to Dr. Topel’s reply to my Supplemental Report (“Topel Supplemental Reply”).¹ I have also been asked to respond to Dr. Topel’s declaration in support of Zuffa’s opposition to class certification (“Topel’s Supporting Declaration”),² and to some analyses unsupported by expert opinion that Zuffa included in its brief opposing class certification (“Zuffa Class Cert Opposition”).³ Having carefully reviewed Dr.

1. Professor Robert H. Topel’s Reply to the Supplemental Expert Report of Hal J. Singer, PhD (May 7, 2018) [hereafter “Topel Supplemental Reply”].

2. Declaration of Professor Robert H. Topel in Support of Zuffa, LLC’s Opposition to Plaintiffs’ Motion for Class Certification (April 6, 2018) [hereafter “Topel’s Supporting Declaration”].

3. Zuffa, LLC’s Opposition to Plaintiffs’ Motion for Class Certification (April 6, 2018) [hereafter “Zuffa’s Class Cert Opposition”].

Topel's and Zuffa's arguments and analyses, I am not persuaded to revise any of my prior opinions. Indeed, on this his fourth submission in this matter, Dr. Topel fails yet again to overturn my principal econometric finding that the wage share paid by Zuffa to its Fighters has decreased in an economically and statistically significant way as Zuffa's foreclosure share has increased, even after controlling for more than 1,500 additional factors that could also influence the wage share.⁴ Dr. Topel claims for the first time that the inclusion of a new control (independent) variable into my wage share regression—a tacit admission that wage share is the proper lens of analysis—overturns my key finding. As discussed below, I do not believe that this new variable should be included in my model. However, even if it were appropriate to include his new variable, that would not change the results. That is because Dr. Topel's findings are driven by an elementary data error he made while inserting this new independent variable into my model. The error led him to drop from his regression model data points associated with pre-acquisition Strikeforce events that he claimed were “missing.” When I correct this single error by adding the purportedly “missing” data back into the regression, my impact regression continues to show economically and statistically significant impact associated with Zuffa's foreclosure share.⁵

4. Expert Report of Hal J. Singer, Ph.D. (August 31, 2017) [hereafter “Singer Report”], ¶¶180-187; Expert Rebuttal of Hal J. Singer, Ph.D. (January 12, 2018) [hereafter “Singer Rebuttal Report”], ¶85; Appendix Table A1. I have also submitted a supplemental report that responded to Dr. Topel's Sur-Rebuttal Report (dated Feb. 12, 2018). *See* Supplemental Expert Report of Hal. J. Singer, Ph.D. (April 3, 2018) (“SR3”) (Exhibit 49 to the Declaration of Eric L. Cramer, Esq. (April 6, 2018), recorded on the public docket at ECF No. 534-3 (Apr. 6, 2018)) [hereafter “Singer Supplemental Report”].

5. Prior to his Supplemental Reply (filed May 7, 2018), Dr. Topel had submitted three reports: (1) Expert Report of Professor Robert H. Topel (dated October 27, 2017) (Exhibit 3 to the Declaration of Nicholas A. Widnell (February 16, 2018), recorded on the public docket at ECF No. 524-5 & 528 (Feb. 16, 2018)) [hereinafter “Topel Report”]; (2) Sur-Rebuttal Expert Report of Prof. Robert H. Topel (dated Feb. 12, 2018) [hereinafter “Topel Surrebuttal”]; (3) Declaration of Robert H. Topel, Ph.D. in Support of Zuffa, LLC's Opposition to Plaintiffs' Motion for Class Certification (April 6, 2018) (Exhibit 1 to the Declaration of Stacey K. Grigsby (April 6, 2018), recorded on the public docket at ECF No. 540-5 (Apr. 6, 2018)).

QUALIFICATIONS

2. My qualifications and CV are contained in my prior reports.⁶

I. SUMMARY OF ANALYSIS AND CONCLUSIONS FROM PRIOR REPORTS

3. In this section, I provide a brief summary of the conclusions reached in the three reports I have submitted in this matter (prior to this one),⁷ and the analyses underlying my conclusions.

4. In my initial report, I showed that Zuffa has significant monopsony power, and is widely recognized as the dominant promoter of professional MMA events. I demonstrated Zuffa's market power using indirect evidence showing (1) that Zuffa has high market shares in both the input market for MMA Fighters and the output market for MMA events; and (2) that would-be rival MMA promoters face substantial barriers to entry, largely because of Zuffa's success in locking up the best MMA Fighters into staggered, long-term exclusive contracts.⁸ I also demonstrated Zuffa's market power using direct proof, including evidence of suppressed Fighter compensation, pricing power over MMA events, restricted demand for Fighter services, restricted supply of MMA events, and the exclusion and impairment of potential rivals.⁹

5. My initial report demonstrated that access to a broad stable of top-tier MMA Fighters is a critical input necessary for a successful MMA promotion.¹⁰ As both Zuffa itself and market observers have recognized, Zuffa's restrictive Fighter contracts deprive would-be rival promoters of this critical input; Zuffa's strategy has been so effective that other MMA promoters are at best distant

6. Singer Report ¶¶8-14; Appendix 1; Singer Rebuttal Report, first Appendix.

7. These are the Singer Report, Singer Rebuttal Report, and the Singer Supplemental Report.

8. Singer Report Part III.A; Singer Rebuttal Report ¶¶13-33.

9. Singer Report Part III.B; Singer Rebuttal Report ¶¶34-52.

10. Singer Report Part I.A; *id.* III.C.1; *see also id.* Part III.A.1.

competitors to the UFC, equivalent to minor leagues.¹¹ My report shows that Zuffa's contracts foreclosed high shares of the input market for Fighters.¹² As a consequence, non-Zuffa MMA promoters were prevented from staging successful MMA events that could compete on the level of the UFC, and were also substantially constrained in their ability to offer competitive compensation or promising career paths to MMA Fighters.¹³

6. My initial report showed that the Challenged Conduct¹⁴ (1) has generated substantial anticompetitive effects¹⁵ and (2) cannot be justified on efficiency grounds.¹⁶ These anticompetitive effects include suppressing compensation to UFC Fighters below competitive levels, restricting the supply of Fighter services and (relatedly) the supply of MMA events, and inflating prices to MMA fans and consumers above competitive levels. My analysis shows that Plaintiffs and absent Class Members have suffered antitrust injury due to Zuffa's suppression of Fighter compensation below what it would have been in the absence of the Challenged Conduct. I have estimated aggregate damages to the Bout Class at \$1.6 billion, and aggregate damages to the Identity Class at \$37.2 million.¹⁷ Using two separate and mutually reinforcing methods, I demonstrated that the harm flowing from the Challenged Conduct was widespread across Class Members, and thus caused common impact.¹⁸

11. *Id.* ¶20; *id.* ¶28; *id.* ¶¶156-164.

12. *Id.* Part III.C.2.

13. *Id.* Part III.C.

14. *Id.* ¶2.

15. *Id.* Part III.D

16. *Id.* ¶¶257-290.

17. *Id.* Part VI; Singer Rebuttal Report ¶¶199-209.

18. Singer Report Parts IV and V. Each of my two proofs of common impact uses methodologies successfully employed in antitrust class actions to demonstrate common impact. My econometric proof of impact demonstrated that, depending upon which version of my model is implemented, approximately 98.4 to 99.1 percent of Bout Class members suffered antitrust impact. *See* Singer Report Table 8 (corrected figures reported in Singer Errata).

7. My initial report introduced my wage-share impact regression model (“impact regression”), the primary basis of my proof of anticompetitive effects, impact, and damages. My impact regression analyzes the relationship between: (1) the Challenged Conduct, as measured by share of Fighters locked up by Zuffa into long-term restrictive contracts (“foreclosure share”); and (2) the share of bout-specific revenue (“Event Revenue”) that Zuffa pays to Fighters participating in those bouts (“wage share” or “labor share”). My impact regression demonstrates that, as Zuffa increased its control over the MMA industry by locking up Fighters to long-term exclusive contracts (thereby increasing its foreclosure share), the wage share paid by Zuffa to its Fighters decreased (relative to both Zuffa itself historically and to Strikeforce before it was acquired by Zuffa) in an economically and statistically significant way. This result holds even after controlling for more than 1,500 additional factors that could also influence the wage share.¹⁹

8. Zuffa’s economists first claimed that my impact regressions should be disregarded because (according to them) it is economically incorrect to use wage shares to analyze compensation.²⁰ Indeed, one of their experts, Dr. Oyer, falsely suggested that I had invented the metric for the purpose of this litigation.²¹ Faced with abundant evidence to the contrary,²² Dr. Topel shifted the goalposts in his Sur-Rebuttal Report (dated February 12, 2018), asserting that my impact

19. Singer Report ¶¶180-187; Singer Rebuttal Report ¶¶72-87.

20. Topel Report ¶¶127; ¶130; Expert Report of Professor Paul Oyer (October 27, 2017) [hereafter “Oyer Report”], Part V.A.

21. Oyer Report Part V.A.; ¶30 (claiming that “labor share is not an economically accepted way to evaluate worker compensation,” and that “[l]abor share is not generally accepted in the field of labor economics as a method for determining compensation in a competitive labor market”).

22. Among other things, the evidence shows that economists in general and sports economists in particular have analyzed wage shares extensively (and that even Zuffa’s economists have done so in their capacity as consultants). Singer Rebuttal Report ¶¶88-107. In addition, Professor Alan Manning (a labor economist cited and praised by Zuffa’s economists), filed a declaration explaining “[w]age share can be an appropriate way for a labour economist to analyse compensation,” and that “[w]age share is an appropriate way to analyse the compensation of MMA fighters in this case.” Expert Rebuttal Report of Alan Manning (January 12, 2018), ¶5 [hereafter, “Manning Rebuttal”].

regressions are somehow disconnected from the economic literature on wage share (which he previously claimed did not exist).²³ I showed in my Supplemental Report (dated April 3, 2018) that this new critique is misleading and irrelevant.²⁴

9. Zuffa's economists also claim that compensation levels, rather than wage shares, are the only appropriate focus of analysis here.²⁵ Specifying a model using wage share is the only way to allow (but not guarantee) increases in the foreclosure share to upset the transmission of Zuffa's Event Revenue into Fighter compensation; by using wage level as his dependent variable, Dr. Topel ensures that the foreclosure share can have *no impact* on the transmission of Event Revenue into Fighter wages. This is because his wage level model estimates an average change in wages given a change in Event Revenues, holding constant the foreclosure share; the relevant inquiry here, however, is whether and how changes in foreclosure share alter the relationship between Event Revenues and wages. Dr. Topel does not address, let alone answer this question. As my prior reports explain, a levels-based analysis also would yield incorrect and nonsensical results in this case. Under a levels-based analysis, if Zuffa's Event Revenue increased by 900 percent (a factor of ten), while Fighter compensation increased by only one percent, this would be falsely construed as evidence that monopsony power has *not* been exercised (because the *level* of Fighter pay had risen).²⁶ Dr. Topel's own analysis aptly demonstrates the inadequacy of a levels-based approach: According to Dr. Topel's levels-based regression, when Zuffa's Event Revenue increases, Zuffa shares only a

23. Dr. Topel originally claimed that wage share "is not a measure of anything useful or informative." Topel Report ¶127.

24. Singer Supplemental Report ¶¶12-16; ¶¶21-23; ¶28. My impact regressions analyze the empirical relationship between changes in labor market restrictions and changes in the share of revenue paid to athletes. The existing economic literature clearly establishes that this is a perfectly valid—and indeed quite standard—line of inquiry for economic analysis, particularly when studying the impact of monopsony power. *Id.* See also Singer Rebuttal Report ¶¶95-102.

25. Topel Report ¶¶142-149; Oyer Report ¶¶47-50; see also Topel's Supporting Declaration ¶17.

26. Singer Rebuttal Report ¶39. Sports economists have recognized this defect of levels-based analyses. *Id.* ¶94. See also Singer Supplemental Report ¶34.

minuscule fraction of the increase with its Fighters. Yet Dr. Topel's levels-based regression attributes this entirely to competitive forces, thus assuming away any possible effect of the Challenged Conduct.²⁷

10. Based on Zuffa's economists' prior claims in in other proceedings (e.g., before the FTC), my initial report anticipated that Zuffa's economists would offer an efficiency defense of the Challenged Conduct by claiming that Zuffa must be permitted to exercise monopsony power over its Fighters for the good of the sport.²⁸ Dr. Topel did not disappoint: His primary efficiency defense of the Challenged Conduct amounts to the evidence-free claim that Zuffa needs its restrictive Fighter contracts to prevent its Fighters from (a) "free riding" off Zuffa's promotional spending (which, he asserts, increase Fighters' ability to generate revenue), and then (b) cashing in by switching to a competing promoter for higher pay before Zuffa has had a chance to earn a sufficient return on its promotional spending.²⁹ Thus, Dr. Topel views Zuffa's restrictive Fighter contracts as necessary for incentivizing investment; according to Dr. Topel, Zuffa can earn a sufficient return on these investments only through the exercise of monopsony power over its Fighters—that is, by paying them less than what they would earn under more competitive conditions.³⁰ Dr. Topel provides no

27. According to Dr. Topel's levels-based analysis, a one percent increase in Event Revenue is predicted to increase Fighter compensation by just 0.08 percent. Singer Supplemental Report ¶¶35-37; *see also* Topel Report Exhibit 13, columns (4) – (6). Dr. Manning testified that this effect is so implausibly small that Dr. Topel "should have had alarm bells going off in his head." Deposition of Alan Manning [hereafter "Manning Dep"] 129:13-23 ("I mean, if you look at Dr. Topel's regression, . . . the consequence of this endogeneity would be that the coefficient gets biased towards zero, meaning that it's much smaller than it truly is. And when he estimates coefficient, which is about .08, I think he should have had alarm bells going off in his head that there was something wrong with it.").

28. Singer Report ¶¶257-290.

29. Topel Report, ¶¶25; ¶42; ¶¶85-89; ¶¶113-114. *See also* Topel's Supporting Declaration ¶12. Dr. Topel has also asserted that the Challenged Conduct reduces what he calls "substantial transaction costs." Topel Report ¶¶90-97; *see also* Topel's Supporting Declaration ¶13. Dr. Topel has provided no evidence of any such costs, let alone evidence that the Challenged Conduct has reduced them significantly. Singer Rebuttal Report ¶¶221-226.

30. Singer Rebuttal Report ¶¶69-71. Dr. Topel conceded in his deposition that eliminating the challenged contractual provisions would create "a transfer of wealth from Zuffa to the athletes." Deposition of Robert Topel [hereafter "Topel Dep."] at 76:4-77:3. *See also id.* at 84:11-18 ("Q. It's a transfer of wealth, in your view, from Zuffa to the fighters because in this instance Zuffa would either have to pay the fighters more or someone else would pay the

evidence or analysis demonstrating that Zuffa (which does not invest anything in Fighter training) would have invested less in a but-for world without the Challenged Conduct (much less evidence that aggregate, market-wide investment would have been lower).³¹ To the contrary, both the sports economics literature and the experience of other professional sports leagues with labor market restrictions such as the “reserve clause” suggest that elimination of the Challenged Conduct would benefit Fighters, consumers, and the MMA industry as a whole.³² Significantly, none of Zuffa’s economists—one of whom (Dr. Blair) is a sports economist—has made any attempt to rebut this extensive evidence.³³

11. In my Supplemental Report, I responded to Dr. Topel’s Sur-Rebuttal Report. As explained above, my Supplemental Report responded to new incorrect and misleading claims with respect to the use of wage share to evaluate athlete compensation; Dr. Topel made these claims in his Sur-Rebuttal Report after he had abandoned his original, untenable position that wage share is not a measure of anything useful or informative.³⁴

fighters more, right? ... A. I think I see where you’re going with it and yes.”). Dr. Topel also admitted that eliminating the challenged contractual provisions could enhance fighter mobility and lead to higher fighter compensation, at least in the short run. *Id.* at 84:25-85:5 (“Q. So for the existing stock of Zuffa athletes eliminating the challenged contracts, at least in the short run, would enhance fighter mobility and lead to higher fighter compensation, correct? A. It could do that.”). *See also id.* at 86:1-11 (“Q. Is it fair to say in the short run if we eliminate the challenged contractual provisions, one immediate effect is that fighters get paid closer to the amount of Event Revenue that they generate for the promotion; is that fair? ... A. They’ll get paid more than they would have because they’re getting some of the returns on the investment that were previously shared with – with the investing firm.”).

31. Singer Rebuttal Report ¶¶213-220. Dr. Topel claims that the Challenged Conduct is procompetitive because some other MMA promoters have followed Zuffa’s lead by including some provisions similar to Zuffa’s in their own Fighter contracts. As I explain in my Rebuttal Report, Zuffa’s adoption of exclusive provisions incentivized non-Zuffa promoters to follow suit by adopting the “industry standard” established by Zuffa. In addition, other MMA promoters’ Fighter contracts were, in practice, less restrictive than Zuffa’s, allowing Fighters to depart when presented with a better offer from Zuffa. I also explained that conduct that is anticompetitive when practiced by a dominant firm is not necessarily anticompetitive when practiced by a firm without market power. Singer Rebuttal Report ¶¶235-239.

32. Singer Report ¶¶286-290.

33. Singer Rebuttal Report ¶211.

34. Singer Supplemental Report Part I.B; Topel Report ¶127.

12. Dr. Topel has also claimed incorrectly in his Sur-Rebuttal Report that my wage share regression assumes that Fighters are the “only material drivers” of Event Revenue.³⁵ This is false; neither my analysis nor the economic literature on wage shares makes any such assumption. Consistent with the existing literature, my impact regression allows the data to inform the extent to which Fighters contribute to Zuffa’s Event Revenue. In particular, my wage share analysis makes use of two key statistical benchmarks.³⁶ The first is based on the share of revenue Zuffa paid to its Fighters when it had foreclosed a smaller proportion of the market (due to both Zuffa’s smaller share and its less restrictive Fighter contracts), and thus had less monopsony power.³⁷ The second is based on the share of Event Revenue that Strikeforce paid its Fighters before Zuffa acquired it.³⁸ According to both benchmarks, non-Fighter inputs contribute significantly to MMA revenue.³⁹ Nothing in my analysis indicates that Fighters would earn 100 percent of Event Revenue (or of any increase in Event Revenue) in the but-for world; what my impact regressions demonstrate is that Fighters would earn a significantly larger share of Event Revenue under the more competitive conditions that would prevail in the but-for world.⁴⁰

13. My Supplemental Report also refuted Dr. Topel’s claim that the fact that his levels-based analysis assumes away the effect of the Challenged Conduct “is a virtue, not an indictment.”⁴¹ As explained above, Dr. Topel’s own levels-based analysis demonstrates that this is incorrect. Dr.

35. Topel Surrebuttal Report ¶16; *id.* ¶21.

36. Singer Rebuttal Report ¶3; *id.* ¶¶73-75; Singer Report ¶183; Singer Supplemental Report ¶17.

37. Singer Rebuttal Report ¶74.

38. *Id.* ¶75.

39. For example, Strikeforce paid approximately 63 percent of its revenue to Fighters (and thus 37 percent to non-Fighter inputs) before it was acquired by Zuffa. Singer Report ¶248; *id.* Table 9.

40. *Id.* Tables 9-11. Similarly, none of the published economic analyses that I cited claimed that athletes would receive 100 percent of team revenue (or of any increase in team revenue), even under the most competitive conditions. Singer Rebuttal Report ¶96-97; *see also* Singer Supplemental Report ¶18.

41. Topel Surrebuttal Report ¶11.

Topel's levels-based regression finds that Zuffa shares only a small fraction of any increase in its Event Revenue with Fighters, but *assumes* that this paltry payout to Fighters is unrelated to the Challenged Conduct.⁴² This illustrates the fundamental flaw in a levels-based approach: Virtually *any* increase in Fighter compensation is interpreted as evidence of procompetitive compensation practices—no matter how trivial the increase may be in comparison to dramatic increases in Zuffa's Event Revenue.⁴³ Dr. Topel's levels-based analysis also suffers from a technical econometric problem known as endogeneity bias, as explained in my prior reports and by Professor Manning.⁴⁴ Finally, my Supplemental Report refuted a laundry list of additional incorrect and misleading claims that appeared in Dr. Topel's Surrebuttal Report and in Zuffa's *Daubert* motion to exclude my testimony.⁴⁵

II. DR. TOPEL'S SUPPLEMENTAL REPLY IS WITHOUT MERIT

14. Dr. Topel's Supplemental Reply raises several critiques of the adjustment to my impact regressions that I made in my Supplemental Report as a means of responding to a new argument Zuffa raised in its *Daubert* motion. More specifically, I added a variable for Zuffa's promotional spending to my impact regression models in response to Zuffa's new assertion *without any proof* that—contrary to Dr. Topel's prior claims and all available evidence—an increase in Zuffa's promotional expenditures would somehow increase the demand for Zuffa events without

42. Singer Supplemental Report ¶¶35-37.

43. *Id.* Figure A1 (showing Zuffa's Event Revenue over time); *see also* Figure 1 below.

44. Singer Rebuttal Report ¶¶115-120; Manning Rebuttal ¶30 ("The technical term used by econometricians for this problem is "endogeneity" or "measurement error" in an explanatory variable. By introducing an explanatory variable that can only measure MRP with significant error, Dr. Topel potentially introduces bias into all of his regression coefficients. In contrast, Dr. Singer's approach avoids this problem and so is the correct methodology."). *See also* Manning Dep. 129:13-23.

45. Singer Supplemental Report ¶¶38-51.

simultaneously increasing the demand for Zuffa Fighters.⁴⁶ It bears noting that Dr. Topel has failed to show how Zuffa's investments increased demand for Zuffa events without also increasing demand for Zuffa's Fighters; such evidence would motivate the inclusion of an additional independent variable in my wage share regression that *might* be correlated with both the foreclosure share and the wage share. If Dr. Topel is wrong about the relative productivity of Fighter and non-Fighter inputs⁴⁷—that is, if Zuffa's promotional expenditures increased the demand for Zuffa events in part by increasing demand for Zuffa Fighters—then in a more competitive market Zuffa would, all else equal, be expected to pay its Fighters a proportional share of any increases in its Event Revenues.⁴⁸ This is because in a more competitive market, Fighters would capture something closer to their marginal revenue product; as Event Revenues rise, wages would rise proportionately to reflect higher Fighter productivity.⁴⁹ Therefore, if Dr. Topel is wrong in this regard, there is *no economic basis* for including an additional control variable that captures promotional spending (or any other additional category of Zuffa spending).⁵⁰ Notwithstanding the difficulty in conceiving of an event-related

46. Zuffa, LLC's Motion To Exclude The Testimony Of Dr. Hal Singer Under *Daubert* (February 16, 2018) [hereafter "Zuffa Daubert Brief"] at 19 ("if Zuffa increases its advertising and generates more viewers, *wage share would decrease*, but through a purely procompetitive effect") (emphasis added).

47. Indeed, my econometric results suggest that non-Fighter inputs have, if anything, become *less productive* relative to Fighters' productivity over time, as indicated by the positive coefficient on the time trend variable. See Singer Supplemental Report at ¶29 ("The coefficient on the time trend is positive and significant, indicating that non-Fighter inputs have, if anything, become *less* productive relative to Fighter inputs over time. This shows that, under more competitive conditions, Fighter compensation should have risen at least in proportion to Event Revenue, if not more rapidly.").

48. Wage shares would provide the right approach to analyzing Fighter compensation and not wage levels, as Dr. Topel now seems to acknowledge.

49. See Singer Supplemental Report ¶¶ 11, 12, 21 ("The only necessary factual underpinning for my analysis, as in prior studies, is that *change* in Event Revenue is a suitable proxy for a *change* in Fighter MRP over that same period, such that, all else equal, Event Revenue is proportional to (not equal to) Fighter MRP.").

50. Even if counterfactually Dr. Topel produced evidence showing that non-Fighter inputs became relatively more productive over time, that would be not be sufficient to undermine my proof of economic impact. This is because my regression controls for that possibility with hundreds of independent variables. That Dr. Topel has failed to identify an omitted variable that is capable of upsetting my principal finding linking increasing foreclosure share to shrinking wage share refutes Dr. Topel's and Zuffa's claims in this regard empirically.

expenditure that does not increase the productivity of Fighters, I still allowed for the possibility of an “omitted variable” in my wage share regression that, when included, would remove the economic and statistical significance of the Foreclosure Share.⁵¹ Yet my key finding was upheld even after controlling for promotional spending.

15. In his fourth report, Dr. Topel now presents new regressions that purport to identify a different omitted variable—namely, all event spending (save fighter compensation), including but not limited to promotional spending. He constructs a new independent variable for my wage share regression using a data source that was available to Dr. Topel *before his first report*, yet that he did not use until his fourth. Not only has Zuffa previously disavowed the accuracy of this data source, but Dr. Topel’s new variable includes new data fields (capturing non-promotional event spending) unrelated to any hypothesis that Dr. Topel has ever advanced in this case. As I show below, his results are driven by an elementary data error, which caused Dr. Topel to drop from his regression analysis what he claimed were “missing” data points associated with pre-acquisition Strikeforce events. In fact, these data are *not* missing from Zuffa’s production. When I correct this single error by adding the purportedly “missing” data back into the regression—without making any additional modifications—the regression continues to show economically and statistically significant impact associated with Zuffa’s foreclosure share, just as before. Accordingly, Dr. Topel’s latest model fails to identify an omitted variable in my wage share regression. Dr. Topel’s new regressions also suffer from other flaws, which I discuss below. Finally, the remaining critiques in Dr. Topel’s Supplemental Reply are also without merit, as also explained below.

51. See, e.g., Hal Singer & Kevin Caves, *Applied Econometrics: When Can an Omitted Variable Invalidate a Regression?*, ANTITRUST SOURCE (Dec. 2017) (explaining that “if the omitted variable has an effect on the dependent variable (Y) and is correlated with the explanatory variable (X), the regression will mistakenly attribute the effects of the omitted variable to the explanatory variable, resulting in omitted variable bias”).

A. My Promotional Spend Regressions Were Prompted by New Claims in Zuffa’s *Daubert* Brief and Dr. Topel’s Surrebuttal Report

16. In its *Daubert* brief, Zuffa claimed for the first time that—in contrast to all available evidence, and Dr. Topel’s prior claims—Zuffa’s promotional efforts have somehow increased the demand for Zuffa events *without* a corresponding increase in the demand for Zuffa Fighters. Specifically, Zuffa claimed, “For example, if Zuffa increases its advertising and generates more viewers, *wage share would decrease*, but through a purely procompetitive effect.”⁵² Thus, Zuffa’s *Daubert* brief implies that increases in Zuffa’s promotional efforts are what accounts for Fighters’ falling wage share—not Zuffa’s increasing foreclosure share, as my impact models show. Similarly, Dr. Topel claimed in his Surrebuttal Report that “if Zuffa successfully promoted MMA, its brand and events, increasing event revenues and attracting more athletes,” then “[Fighter] compensation as a fraction of event revenue will decline.”⁵³ This claim was new: Neither Zuffa nor Dr. Topel had previously attempted to argue that Zuffa’s promotional investments would expand the demand for Zuffa events without a corresponding increase in the demand for Zuffa’s Fighters.⁵⁴ Again, if Dr. Topel is wrong in this regard, and if Zuffa’s promotional spending increases the productivity of its Fighters (as all available evidence and economic theory make clear), then one should not expect a change in Fighters’ wage share attributable to a change in promotional spending—Fighters should

52. Zuffa *Daubert* Brief at 19 (emphasis added).

53. Topel Surrebuttal ¶23.

54. In his initial report, Dr. Topel presented an economic model purporting to demonstrate how, in theory, Fighters’ wage share could decline as a result of Zuffa increasing its promotional activities. But—in contrast to Zuffa’s and Dr. Topel’s new claims—that economic model assumed that Zuffa’s promotional activities *do* increase the demand for Zuffa’s Fighters. *See* Topel Report ¶¶308-315. As explained in my Rebuttal Report, this model is fatally flawed, and relies on extreme and inapplicable assumptions. *Singer Rebuttal Report* ¶¶139-143. *See also* Part III below (explaining that Dr. Topel reiterates his flawed model in the Topel Class Cert Opp, without addressing any of my critiques or providing any empirical basis for it).

continue to capture the same proportion of Event Revenues as they had before the supposed increase in promotion.

17. In my Supplemental Report, I responded to this new claim in three ways. *First*, I explained that, for a promotional expenditure such as advertising to cause wage share to fall, all else equal, it would need to somehow cause additional revenues to be generated without also enhancing the revenue-generating power of the Fighters.⁵⁵ This would contradict both the available evidence and Dr. Topel's own claims, which show that (1) as in other professional sports, Fighters are the major draw for MMA consumers, and thus are a key driver of Zuffa's Event Revenue;⁵⁶ and, (2) Zuffa's promotional investments *enhance* the revenue-generating ability of its Fighters.⁵⁷ As I explained in my Supplemental Report, it could hardly be otherwise; because its Fighters are the only inputs on display during Zuffa's event (besides the referee and announcers), it is implausible for Zuffa to promote an event in a way that does not increase the marginal revenue product of its

55. Singer Supplemental Report ¶¶26-27.

56. *Id.* ¶¶22-23; *see also* Singer Report ¶20 (citing record evidence demonstrating that MMA promoters rely on high-profile, highly-ranked Fighters at the Top of the Card to draw audiences); *id.* ¶28 ("the fighters themselves, not the UFC titles, are what truly drive PPV buy rates," citing Richard McGowan and John Mahon, *Demand for the Ultimate Fighting Championship: An Econometric Analysis of PPV Buy Rates* 6(6), JOURNAL OF BUSINESS & ECONOMICS 1032-1056, 1047 (2015); Singer Report ¶¶156-164 (showing that Zuffa and market analysts such as Deutsche Bank and Moody's recognized that other MMA promoters could not compete effectively without a deep roster of talented Fighters, and that the challenged contracts deprived other MMA promoters of this critical input); *see also* Singer Rebuttal Report ¶132 (showing that Zuffa relies heavily on Headliners (top 15 Fighters) to fill the Top of the Card, and that at least one of the Fighters at the Top of the Card was a Headliner in 158 of 159 events UFC PPV events from 2005 to May 2017; *id.* ¶130 (showing that variation in Fighter rank explains 93.2 percent of the variation in average Event Revenue, and 92.5 percent in the variation in average Fighter compensation).

57. Singer Supplemental Report ¶23; *see also* Topel Report ¶113 ("The competitive value of a successful athlete hinges on promotion that generates consumer awareness of the athlete,"); *see also id.* at ¶311 ("Zuffa is better than its competitor at making its athletes more effective revenue-generators[.]") *see also* Topel Dep. at 23:24-24:3 ("Q. So when Zuffa makes its fighters more effective revenue generators, they're able to generate more revenues when they fight; is that fair? A. Yes."); *id.* at 24:20-25:9 ("Q. Okay. So if what Zuffa does is makes it – makes its fighters more effective revenue generators, then what you were saying is that Zuffa in this example is causing the marginal revenue product of its fighters to increase, correct? A. Yes. Q And is it your opinion that Zuffa is particularly good at is causing its fighters to be more effective revenue generators? A. I think that's Zuffa's position and I think that's what the evidence tends to show, yes. Q. Is it your opinion? A. I just said yes.").

Fighters.⁵⁸ Therefore, Zuffa's claim that increased promotional expenditures could explain Fighters' declining wage share contradicts both the facts of this case and basic economic principles.

18. *Second*, I explained in my Supplemental Report that my impact regression model already uses standard methods to control for a wide range of factors that could affect Zuffa's Event Revenue (and thus the wage share paid to Fighters). These include a time trend, which controls for the possibility that the contribution of non-Fighter inputs to Event Revenue (such as Zuffa's promotional expenditures or its promotional acumen) has increased over time.⁵⁹ My original model also included year-to-year fixed effects, which control for the possibility that contribution of non-Fighter inputs has risen from year to year.⁶⁰ My model also originally included fixed effects by promoter, which control for the possibility that Zuffa has superior promotional acumen relative to other promoters.⁶¹ Finally, my impact regressions include thousands of Fighter-specific independent variables, which collectively control for the possibility that Zuffa's promotional activities or acumen

58. As I explained in my Supplemental Report, if Zuffa's promotional expenditures were substitutes for (rather than complements to) its Fighters, then Zuffa would not need contracts to lock up top-ranked Fighters; Zuffa could populate the Top of the Card with mediocre Fighters and compensate for the mediocrity through increased promotion. According to this logic, Zuffa's rivals could have supplanted its dominant position long ago by staging heavily promoted bouts featuring unremarkable Fighters. *See* Singer Supplemental Report ¶27. It bears emphasis that Dr. Topel has consistently asserted (without evidence) that the Challenged Conduct was economically efficient because it was necessary for Zuffa to prevent Fighters from "free riding" off Zuffa's promotional investments (which increase Fighters' market value) and then switching to a competing promoter before Zuffa had a chance to earn a return on its promotional investments. Topel Report ¶25; ¶42; ¶¶85-89; ¶¶113-114.

59. Singer Supplemental Report ¶29. In fact, the coefficient on the time trend is *positive* and significant, indicating that Zuffa's unobserved productivity has, if anything decreased over time; thus, under more competitive conditions, Fighter compensation should have risen at least in proportion to Event Revenue, if not more rapidly. *Id.*

60. *Id.* ¶30. In fact, the coefficients on the year-to-year fixed effects are not statistically significant, indicating no significant year-to-year shifts in the contribution of non-Fighter inputs to Zuffa's Event Revenue after the time trend is taken into account. *Id.*

61. *Id.* ¶31. The coefficient on the UFC fixed effect is negative and statistically significant, indicating that the wage share is significantly lower at the UFC relative to other promoters. Although this result could be interpreted as further evidence of Zuffa's monopsony power, attributable at least in part to the Challenged Conduct, my analysis conservatively assumes that this is not the case, and that the discrepancy would persist in the but-for world, conservatively attributing all of the effect to Zuffa's promotional acumen.

allow it to procompetitively capture incremental revenue generated by its Fighters, including its most productive Fighters.⁶²

19. *Third*, while neither Dr. Topel nor Zuffa presented any evidence to support Zuffa's new argument that Zuffa's promotional activities could have had a significant effect on Zuffa's Event Revenue independent of Fighters, let alone that Zuffa's promotional activities somehow shrank the proportion of Event Revenue attributable to Fighters, I provided additional analyses to refute Zuffa's new unsupported claim. For my new analysis, I used financial records to calculate promotional expenditures per bout for Zuffa and Strikeforce, and explicitly controlled for these promotional expenditures in my regression model. After doing so, my impact regressions continued to find a negative and statistically significant relationship between Zuffa's foreclosure share and the wage share paid to Zuffa's Fighters, just as before; in addition, the coefficient on Zuffa's promotional expenditures is statistically indistinguishable from zero.⁶³ This provides further confirmation that there is no evidence that Zuffa's promotional activities have increased Zuffa's contributions to its event revenues relative to the contributions of its Fighters.

20. In his Supplemental Reply, Dr. Topel raises several critiques of my regressions that included variables specifically to capture promotional spending. As I explain in Part II.B below, all of Dr. Topel's critiques are without merit. Moreover, as I explain in Part II.C below, Dr. Topel's attempts to implement "corrections" to my promotional spend regressions are fatally flawed, and his results are driven by an elementary data error. In Part II.D, I explain that the remaining critiques in Dr. Topel's Supplemental Reply are without merit. These include: (1) Dr. Topel's new critiques regarding standard controls included in my regression, such as a time trend and fixed effects; (2) Dr.

62. *Id.* ¶32.

63. *Id.* ¶33; Appendix Table A2.

Topel's new suggestion that Zuffa enhanced its own productivity in certain unspecified and unobservable ways without simultaneously enhancing the productivity of its Fighters; and (3) other meritless critiques raised in Dr. Topel's Surrebuttal Reply.

B. Dr. Topel's Critiques of My Impact Regressions That Include Variables Specifically Capturing Promotional Spending Lack Merit

21. Dr. Topel asserts that my impact regressions specified with a variable specifically capturing Zuffa's promotional spending are a belated response to a critique already articulated in his prior reports.⁶⁴ This is incorrect; this adjustment to my impact regression was made in response to Zuffa's new claims, as explained in Part II.A above.

22. Dr. Topel also critiques the data that I use to measure promotional spending, which are drawn from the annual financials of Zuffa and Strikeforce.⁶⁵ Dr. Topel asserts that I should have used data drawn from Zuffa's event-level P&L statements.⁶⁶ But according to Zuffa itself, its event-level P&Ls are "merely internal management tools," that are both unaudited and incomplete.⁶⁷ In using Zuffa's annual financial statements to construct my promotional spend variable, I simply followed Zuffa's guidance. (As explained below, Dr. Topel did not.) Relatedly, and for this reason, I deliberately avoided using Zuffa's event-level P&Ls when measuring Fighter compensation in my regressions, and relied instead on a separate compensation database provided by Zuffa.

64. Topel Supplemental Reply ¶4.

65. *Id.* ¶¶5-8.

66. *Id.* ¶12.

67. Letter from Marcy Norwood Lynch to Daniel Silverman (July 17, 2017). Zuffa's event-level P&Ls frequently record missing values for one or more line items that relate to promotional spend. For example, Zuffa's event-level P&Ls include data fields for Branding, Ticket Advertising, PPV Advertising, or Other/Digital Advertising. In 62 events (comprising 41 percent of the total number of events covered by the event-level P&Ls), one or more of these data fields have been left blank.

23. *Third*, Dr. Topel asserts that my regressions specified with variables specifically capturing Zuffa's promotional spending would "crash" if they were limited to Zuffa events, excluding Strikeforce pre-acquisition events.⁶⁸ I have repeatedly explained why Dr. Topel has no basis for discarding these data.⁶⁹ Setting this aside, even if one were to (improperly) discard the Strikeforce pre-acquisition events, the regression would not "crash;" the regression software would automatically drop one of the year fixed effects, or the promotional spend variable (it does not matter which); the regression would run as usual, and would continue to show impact.⁷⁰ This reflects the fact that my regression model already controls for year-to-year variation in promotional spend within Zuffa.⁷¹ Put differently, Dr. Topel is complaining that my regressions are *already* robust to *any* year-to-year changes in *any* unobserved factor (including promotional spend). In any case, neither the promotional spend variable nor any of the year fixed effects are actually dropped, because my promotional spend regression, like my original impact regression, does not rely exclusively on variation within Zuffa over time, but also uses variation between Zuffa and Strikeforce (before it was acquired by Zuffa). As I have explained previously, Dr. Topel has no basis for ignoring or discarding this second source of variation in wage shares, which uses Strikeforce as a competitive benchmark.⁷²

68. Topel Supplemental Reply ¶7.

69. Singer Rebuttal Report ¶¶80-83; Singer Supplemental Report ¶¶41-44.

70. As explained in my prior reports, although dropping the Strikeforce pre-acquisition data is not justified, doing so does not invalidate my results; my impact regressions continue to show impact and damages. Singer Rebuttal Report ¶86; Singer Supplemental Report ¶40.

71. Singer Supplemental Report ¶30.

72. Singer Rebuttal Report ¶3 ("The regression uses two sources of variation: (1) variation in Zuffa's own compensation practices over time (comparing historical time periods when Zuffa was less dominant to more recent time periods); and (2) variation between Zuffa's compensation practices and those of Strikeforce before Zuffa acquired it (comparing Zuffa's compensation practices to those of a non-dominant rival)."). *See also id.* ¶¶73-85; Singer Supplemental Report ¶¶41-44.

24. *Fourth*, in my regressions specified with variables specifically capturing promotional spending, I created one variable measuring Zuffa's promotional expenditures, and another measuring Strikeforce's pre-acquisition promotional expenditures. The Zuffa promotional spend variable was set equal to zero for Strikeforce pre-acquisition events, and the Strikeforce pre-acquisition promotional spend variable was set equal to zero for Zuffa events. Dr. Topel claims (without citation to any authority) that this is somehow "arbitrary."⁷³ It is not: The Zuffa promotional spend variable was set equal to zero for Strikeforce pre-acquisition events because Zuffa did not promote Strikeforce events before Zuffa acquired Strikeforce. Conversely, the Strikeforce pre-acquisition promotional spend variable was set equal to zero for Zuffa events because Strikeforce did not promote Zuffa events before Zuffa acquired Strikeforce. Dr. Topel asserts (without citation to any authority) that the construction of my promotional spend variables repeats "the same error"⁷⁴ that Dr. Topel described in his Surrebuttal Report in the context of my foreclosure share variable. It does not; there was no such error to begin with, as I explained in my Supplemental Report.⁷⁵ Dr. Topel also claims (again without citation to any authority) that, because the promotional expenditures for Zuffa bouts and Strikeforce's pre-acquisition bouts are highly correlated, "there is no meaningful 'residual variation' that allows one to estimate the effects of these variables[.]"⁷⁶ This statement is incorrect; that two independent variables are *highly* correlated (as opposed to *perfectly* correlated) does not violate any of the conditions underlying standard multiple regression models.⁷⁷ It is true that, when two independent variables are highly correlated, a regression model may have

73. Topel Supplemental Reply ¶9.

74. *Id.*

75. Singer Supplemental Report ¶39; Singer Rebuttal Report ¶84; Singer Report ¶¶182-183; *id.* n.454.

76. Topel Supplemental Reply ¶10.

77. Jeffrey Wooldridge, *Introductory Econometrics: A Modern Approach* (Thompson 4th ed. 2009) [hereafter "Wooldridge"] at 96-99.

difficulty disentangling their independent effects—although this issue is mitigated or eliminated when the sample size is large, as is the case here, or when the researcher is not interested in the precise coefficient on the control variables.⁷⁸ This is also the case: I am not attempting to disentangle the contribution of each firm’s promotional expenditures on Zuffa’s wage share; the purpose is to control for the collective effect of promotional expenditures, period. Finally, a standard *F*-test confirms that Zuffa’s and Strikeforce’s promotional expenditures do not collectively contribute significantly to the explanatory power of the regression.⁷⁹ This confirms, once again, that neither Zuffa’s nor Strikeforce’s promotional expenditures belong in the impact regression model, regardless of how correlated they are with one another.

25. *Fifth*, Dr. Topel claims that my promotional spend regressions “attempt to control for only one of many relevant categories of investments that Zuffa makes to improve the quality of its events: promotional expenditures.”⁸⁰ As explained in my Supplemental Report, I constructed my promotional spend variable to account for any expenditures that plausibly could be classified as Zuffa’s “investments and efforts in increasing the value of the events and athletes it promotes,”⁸¹ consistent with Zuffa’s and Dr. Topel’s new claims. Specifically, my promotional spend variable includes line items that explicitly relate to branding, marketing, promotions, or advertising.⁸² In his Supplemental Reply, Dr. Topel now claims, for the first time, that items such as “production costs (e.g., set design and construction costs, video production costs, and equipment costs)”⁸³ should be counted as non-Fighter inputs that would somehow expand the demand for Zuffa events without

78. *Id.*

79. The *F*-statistic is close to zero; this means that the coefficients on Zuffa’s and Strikeforce’s promotional expenditures are nowhere close to being jointly statistically significant ($F = 0.06$; $\text{Prob} > F = 0.9373$).

80. Topel Supplemental Reply ¶15.

81. Singer Supplemental Report ¶33 (citing Topel Surrebuttal Reply ¶8).

82. Singer Supplemental Report ¶33, n. 97.

83. Topel Supplemental Reply ¶15.

expanding the demand for Zuffa Fighters. As before, Dr. Topel provides no evidentiary basis—whether in the record or in the literature—for the notion that these inputs (or any other inputs) would diminish the *relative* revenue-generating ability of its Fighters and thus no basis for the notion that the use of such inputs would diminish Fighters’ wage share; like promotional investments, spending on set design or video production is clearly a complement to Fighters, rather than a substitute for them. In other words, improvements in set design and video production are likely to enhance event revenues in part by enhancing the demand for Zuffa’s Fighters’ services. In any case, as explained in the next section, even when Dr. Topel indiscriminately throws all non-Fighter costs into the impact regression, my results are not overturned. Dr. Topel’s conclusion to the contrary is based on an elementary data error that omits “missing” pre-acquisition Strikeforce data that are not actually missing.

26. *Sixth*, Dr. Topel claims that, if my regression that includes the promotional spend variables (rather than my original impact regression) is used to estimate damages, then aggregate damages fall by 46 percent (from \$1,598 million to \$856 million).⁸⁴ Dr. Topel’s new damages calculation is irrelevant. I implemented this analysis simply to address a new and unfounded claim, not as a replacement to my original impact model. I implemented my promotional spend regression even though (1) my regression already uses standard methods to control for more than 1,500 factors that could affect Zuffa’s Event Revenue;⁸⁵ and (2) there was no evidence, or basis in theory, for Zuffa’s new claim that its promotional activities somehow shrank the proportion of Event Revenue attributable to Fighters by increasing the demand for Zuffa events without a corresponding increase in the demand for Zuffa Fighters.⁸⁶ Moreover, the results of my promotional spend regressions

84. Topel Supplemental Reply ¶19.

85. Singer Supplemental Report ¶3; ¶¶29-32; Singer Rebuttal Report ¶124; Singer Report ¶¶180-187.

86. Singer Supplemental Report ¶33.

confirm that, holding all else constant, Zuffa's promotional expenditures had no effect on Fighter wage share; the coefficient on Zuffa's promotional expenditures is statistically indistinguishable from zero.⁸⁷ For all of these reasons, there is no basis to include Zuffa's promotional expenditures in the regression model, and my original impact model should be used to calculate damages, just as before.

C. Dr. Topel's Purported "Corrections" To My Regressions Specified with Promotional Spend Variables Are Fatally Flawed, and His Results Are Driven by an Elementary Data Error

27. In Dr. Topel's Supplemental Reply, he uses data from Zuffa's event-level P&Ls to create a new variable purporting to measure "all event costs besides athlete compensation, including promotional costs, production costs, and other event costs."⁸⁸ Dr. Topel claims that, after controlling for these event-level non-Fighter costs, the impact regression no longer shows a negative and statistically significant relationship between Zuffa's foreclosure share and Fighters' wage share.⁸⁹ Dr. Topel is wrong; his results are driven by an elementary data error. In particular, Dr. Topel's regression discards data points from certain Strikeforce pre-acquisition events because, he claims, these events lack data for event-level non-Fighter costs.⁹⁰ But the data are not actually missing.⁹¹ As seen in Appendix Table A1, when I simply add the "missing" data back into Dr. Topel's own regression—without making any additional modifications—the regression continues to show impact. In particular, the coefficient on Zuffa's foreclosure share is negative and economically and

87. *Id.* ¶33; Table A2. As explained above, a standard *F*-test also confirms that Zuffa's and Strikeforce's promotional expenditures do not collectively contribute significantly to the explanatory power of the regression, providing further confirmation that neither Zuffa's nor Strikeforce's promotional expenditures belong in the impact regression model.

88. Topel Supplemental Reply ¶20.

89. *Id.* ¶22.

90. *Id.* ¶23.

91. Apparently, Dr. Topel neglected to check Zuffa's production for these data. *See* ZFL-2458186. These data were also included in the work papers for my first report.

statistically significant for the Tracked, Ranked, and Headliner markets. Thus, Dr. Topel has failed to show, as he claims, that my impact regression no longer shows impact after controlling for event-level non-athlete costs.⁹² His result is driven entirely by a data error that caused him to discard Strikeforce pre-acquisition observations. As noted above, and explained in my prior reports, Dr. Topel has no basis for discarding these data.⁹³

28. Dr. Topel also claims that the data error he commits demonstrates the “fragility” of my results.⁹⁴ Specifically, Dr. Topel claims that my regressions no longer show impact when he applies his data error to my original impact regressions by discarding the Strikeforce bouts with purportedly “missing” data.⁹⁵ Dr. Topel is wrong. *First*, although he finds that the coefficient on Zuffa’s foreclosure share is statistically insignificant at conventional levels for the Tracked and Headliner market definitions, the effect remains economically significant for all three definitions, and statistically significant at conventional levels for the Ranked definition.⁹⁶ *Second*, as I explained in my rebuttal report, my impact regressions continue to show that Zuffa’s market foreclosure suppressed the wage share in a statistically and economically significant way even when *all* Strikeforce pre-acquisition bouts (instead of just those with purportedly “missing data”) are discarded from the regression.⁹⁷ *Third*, as seen in Appendix Table A1, if I run Dr. Topel’s new regressions after discarding *all* Strikeforce pre-acquisition bouts (without making any additional

92. Topel Supplemental Reply ¶22.

93. Singer Rebuttal Report ¶¶80-83; Singer Supplemental Report ¶¶41-44.

94. Topel Supplemental Reply ¶23.

95. *Id.*

96. *Id.* ¶23, n. 21. Dr. Topel claims that the coefficient on the Ranked definition is statistically insignificant at conventional levels because it is statistically significant at the ten percent level, but not at the five or one percent levels. *Id.* Dr. Topel is wrong; as I have explained previously, it is standard practice to use the ten percent level of significance; this is confirmed by standard textbooks, as well as references cited by Dr. Topel himself. *See* Singer Rebuttal Report ¶86, n. 306. I also understand the ten percent significance level to be well within the “preponderance” standard applicable to plaintiffs’ proof in this civil case. *Id.*

97. Singer Rebuttal Report ¶86.

changes), they continue to confirm that Zuffa's foreclosure suppressed the wage share in a statistically and economically significant way, just as before. Dr. Topel's "finding" was the result of his having, by his own account, erroneously included only a subset of the Strikeforce pre-acquisition bouts; it is not robust to eliminating all Strikeforce pre-acquisition bouts or including all of those observations.

29. Dr. Topel's new regressions are also flawed in other ways. *First*, Dr. Topel's new variable relies on event-level cost data from Zuffa's event-level P&L statements. As noted above, according to Zuffa itself, its event-level P&Ls are "merely internal management tools," and are both unaudited and incomplete.⁹⁸ This means that Dr. Topel's regressions suffer from measurement error into the independent variable of his regression. By introducing an explanatory variable that can measure event-level costs only with significant error, Dr. Topel potentially introduces bias into *all* of his regression coefficients.⁹⁹

30. *Second*, Dr. Topel calculates non-Fighter event costs as the difference between total event costs and Fighter compensation; in performing this calculation, he measures Fighter compensation using Zuffa event P&Ls. In contrast, my own regressions measure Fighter compensation using a separate compensation database provided by Zuffa for that express purpose. As seen in Appendix Table A1, when I use this separate database of fighter compensation to calculate Dr. Topel's non-Fighter cost variable, the results continue to show impact. In particular, the coefficient on Zuffa's foreclosure share remains negative and economically and statistically

98. Letter from Marcy Norwood Lynch to Daniel Silverman (July 17, 2017).

99. *See, e.g.*, Wooldridge at 320. "Generally, measurement error in a single variable causes inconsistency in all estimators. Unfortunately, the sizes, and even the directions of the biases, are not easily derived." In my own regressions I relied on Zuffa's event-level P&Ls only to measure Event Revenue; there is no other source for this data. But this implies only that the *dependent* variable in my impact regressions (equal to the ratio of fighter compensation to Event Revenue) may be measured with error, and random measurement error in the *dependent* variable is econometrically innocuous. *Id.* at 316-318.

significant for the Tracked, Ranked, and Headliner markets. The results are even more statistically significant when the correct Fighter compensation database is used to calculate Dr. Topel's event-level cost variable.

31. *Third*, Dr. Topel's new variable includes *all* event-level expenses other than Fighter compensation that are recorded in Zuffa's event-level P&Ls, including all cost of sales line items and all overhead expenses. This includes data fields such as taxes, catering expenses, software—even corporate jet costs—that are not remotely related to any hypothesis that Dr. Topel has ever advanced in this case. For example, Dr. Topel has not articulated any theory explaining how a non-promotional expenditure such as the cost of a corporate jet would increase the demand for Zuffa events at all—let alone how such an expenditure would increase the demand for Zuffa events in a way that did not also increase the demand for Zuffa Fighters.

32. *Fourth*, Fighter compensation—the numerator of my dependent variable—and non-Fighter costs are both event-level expenditures, and are jointly determined at a given event.¹⁰⁰ This means that any factor that affects one of them—including the exercise of monopsony power—will tend to affect the other. This implies that Dr. Topel's new regressions suffer from a well-known defect known as endogeneity or simultaneity bias.¹⁰¹ As noted above, Dr. Topel calculates his new variable by subtracting Fighter compensation from total event-specific costs. For an event that generates a given amount of revenue, there is an obvious tradeoff between Zuffa's non-Fighter costs and its Fighter compensation: Assuming Zuffa's events are profitable (which they are), the sum of Fighter costs and non-Fighter costs must be less than total revenue. Moreover, for any given level

100. In contrast, my own promotional spend-variable is not event specific; as explained above, it is calculated from Zuffa's annual P&Ls.

101. Wooldridge at 546 (“Another important form of endogeneity of explanatory variables is simultaneity. This arises when one or more of the explanatory variables is jointly determined with the dependent variable.”). *See also id.* at 546-552.

of profit, Zuffa can afford to spend more on non-Fighter, non-promotional costs—the model in my Supplemental Report already controlled for promotional spending—when it spends less on Fighter compensation. For example, Zuffa can afford to spend more on corporate jets and catering for a given event when it pays its Fighters less. Conversely, when Fighter compensation is relatively high (for example, if Conor McGregor or another household name is on the Top of the Card), Zuffa can afford to spend less on non-Fighter expenses, all else equal. To see this mathematically, note that the wage share is equal to FC/ER , where FC is Fighter compensation and ER is Zuffa's event revenue. Let NFE represent Zuffa's non-Fighter expenses, and let ZP represent Zuffa's profit after subtracting fighter compensation and non-Fighter expenses. Zuffa's profit at a given event can be written as the difference between its event revenue and the sum of its Fighter costs and its non-Fighter expenses:

$$ZP = ER - (FC + NFE) \quad (1.1)$$

Solving for the wage share, we get:

$$\frac{FC}{ER} = 1 - \frac{NFE}{ER} - \frac{ZP}{ER} \quad (1.2)$$

As the equations above make clear, by virtue of a simple accounting identity, anything that decreases Fighter compensation (including the exercise of monopsony power) will, all else equal, tend to correlate with greater non-Fighter expenditures. This is just what Dr. Topel's regression finds: He finds that—holding all else fixed—Fighter compensation as a share of event revenue is negatively correlated with non-Fighter costs.¹⁰² Put differently, Dr. Topel's latest regressions simply confirm that Zuffa pays its Fighters less when it pays its Fighters less.

102. Topel Supplemental Reply, Exhibit 2, columns (7) – (9).

33. This relationship is conveniently illustrated in Dr. Topel's Exhibit 2. As seen below, "Event Fighter Comp" appears explicitly in Dr. Topel's new independent variable (measured as the natural log of the difference between Event Costs and Event Fighter Comp). But the *dependent* variable in the regression (the wage share) is also defined in terms of Fighter compensation: The wage share is simply the ratio of Fighter compensation to Event Revenue. As seen below, the coefficient on Dr. Topel's new independent variable is negative, which is unsurprising given that a decrease in Fighter compensation (and thus an increase in Dr. Topel's new variable), would, by definition, decrease the numerator of the wage share.

TOPEL SURREBUTTAL REPLY, EXHIBIT 2

Exhibit 2: Singer Impact Regressions, including Modified Singer Impact Regression with Event Costs on Right Hand Side									
	Replicate Singer Original Regression (SR1, Table 6)			Singer Original Regression, Excluding Bouts Missing Event-Level Costs			Singer Original Regression, including all non-athlete compensation event costs ^[2]		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Foreclosure Share - Tracked	-0.033*			-0.022			-0.019		
	[0.043]			[0.233]			[0.310]		
Foreclosure Share - Ranked		-0.043*			-0.035			-0.030	
		[0.032]			[0.086]			[0.153]	
Foreclosure Share - Headliner			-0.032*			-0.021			-0.019
			[0.046]			[0.250]			[0.327]
Log (Event Costs - Event Fighter Comp)							-0.007**	-0.007**	-0.007**
							[0.000]	[0.000]	[0.000]
Constant	-0.131*	-0.185*	-0.133*	-0.089	-0.145	-0.090	-0.033	-0.082	-0.034
	[0.049]	[0.021]	[0.049]	[0.142]	[0.056]	[0.146]	[0.607]	[0.316]	[0.609]
Observations	7,154	7,154	7,154	7,067	7,067	7,067	7,067	7,067	7,067

Notes:

[1] Columns 1-3 replicate Table 6 of Dr. Singer's first report. Columns 4-6 exclude bouts that are missing information on event total costs. Columns 7-9 include logged (Event Costs - Athlete Compensation). This additional variable is calculated using Dr. Singer's "event_totalcosts" and "event_total_fighter_comp" fields.

[2] Columns 7-9 exclude bouts missing event-level cost information

[3] Robust p-values are in brackets. ** p<.01, *p<.05.

Source:

[1] Regression Data.dta (Singer Backup)

D. The Remaining Critiques in Dr. Topel's Supplemental Reply Lack Merit

34. Based on a review of Zuffa's non-Fighter costs from its annual P&Ls in Exhibit 1 of Dr. Topel's Supplemental Reply, he observes that Zuffa has increased its non-Fighter expenditures over time. Dr. Topel claims that the fact that Zuffa's non-Fighter expenditures per event were higher

in 2016 than in 2008 somehow “illustrate[s] the importance of” Zuffa’s non-Fighter expenditures.¹⁰³ But the data in Dr. Topel’s Exhibit 1 do not demonstrate that Zuffa’s non-Fighter inputs have somehow become more important over time than Zuffa’s Fighters; all the data show is that Zuffa’s non-Fighter expenditures per event have increased since 2008.¹⁰⁴ In fact, Dr. Topel’s own data show that Zuffa’s expenditures on Fighter compensation per event have increased by significantly *more* than its expenditures on non-Fighter costs from 2008 to 2016, as shown in the Appendix.¹⁰⁵ According to Dr. Topel’s logic, this would demonstrate that Zuffa’s non-Fighter inputs have become *less* important relative to its Fighter inputs over time—exactly the opposite of what he claims.

35. In addition to ignoring Fighter costs, Dr. Topel’s simple observation that non-Fighter costs have increased over the years ignores that Zuffa’s Event Revenues have also increased substantially over time. Figure 1 displays Zuffa’s Event Revenue, Zuffa’s total non-Fighter event costs (as measured by Dr. Topel), and Zuffa’s promotional spend (as measured by my promotional spend regressions), all according to Zuffa’s annual P&Ls. As seen below, Zuffa’s non-Fighter costs have not increased at a particularly rapid pace in relation to Zuffa’s Event Revenue. From 2008 to 2016, Zuffa’s non-Fighter costs increased from \$73.9 million to \$193.2 million, at a constant annual growth rate (“CAGR”) of 12.8 percent.¹⁰⁶ Over the same period, Zuffa’s Event Revenue increased from \$258.8 million to \$666.1 million, at a CAGR of 12.5 percent.¹⁰⁷ In addition, from 2014 to 2016, Zuffa’s Event Revenues climbed to their highest level ever, increasing by 61 percent in just two

103. *Id.* ¶¶16-17; Exhibit 1.

104. *Id.* ¶17; Exhibit 1.

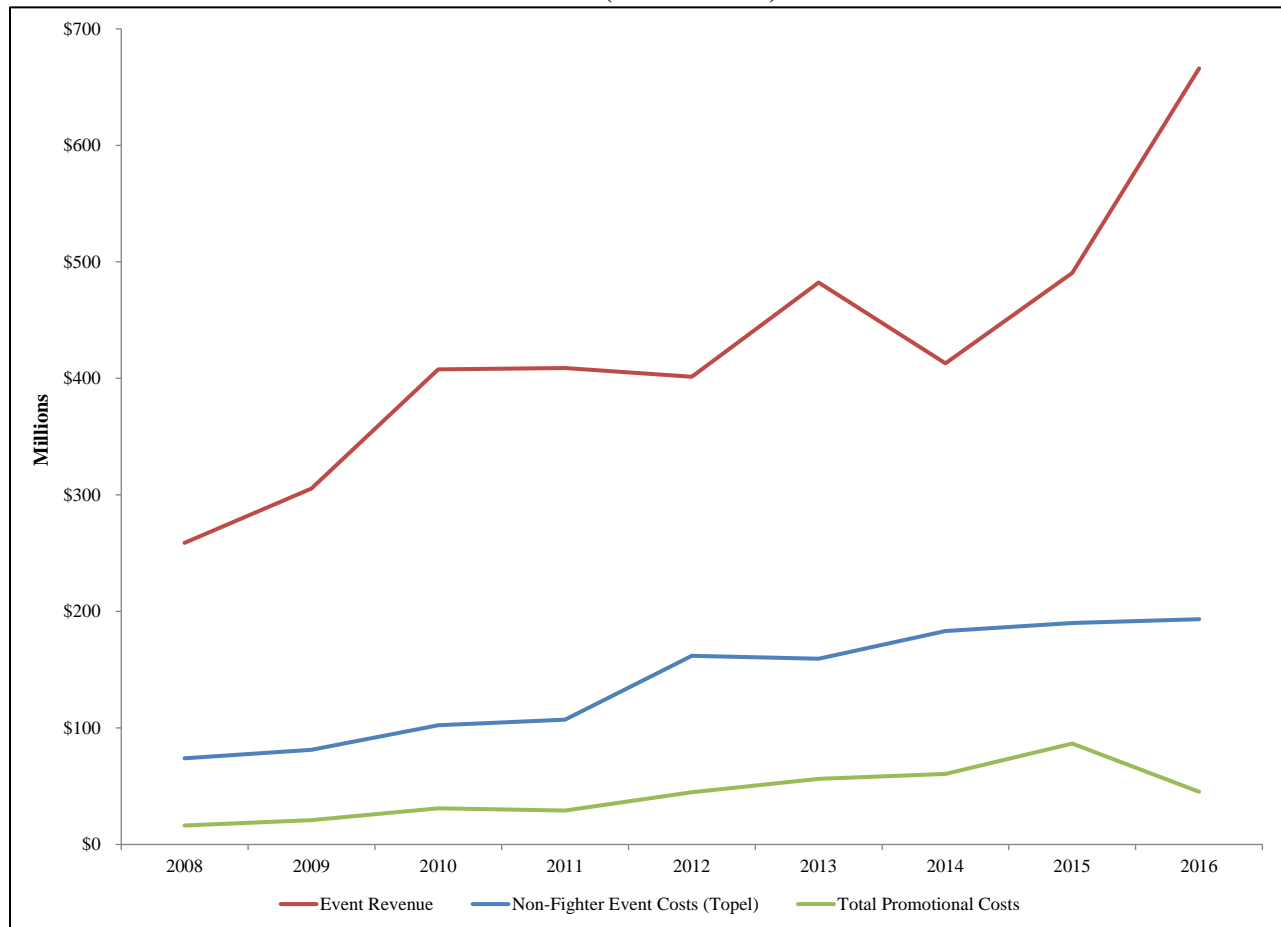
105. As seen in Appendix Table A2, I used Dr. Topel’s work papers for Exhibit 1 (which, unlike the rest of Dr. Topel’s Supplemental Reply, use Zuffa’s annual P&Ls instead of its event-level P&Ls) to calculate Zuffa’s Fighter costs per event. According to these data, Zuffa’s non-Fighter costs per event increased by 51 percent between 2008 and 2016 (from \$3.1 million per event to \$4.7 million per event). In contrast, Zuffa’s Fighter costs per event increased by 75 percent between 2008 and 2016 (from \$2.0 million per event to \$3.4 million per event). (Consistent with Dr. Topel’s calculations in Exhibit 1, the data are converted to 2016 dollars using the Consumer Price Index).

106. Equal to $(\$193.2/\$73.9)^{(1/8)} - 1$.

107. Equal to $(\$666.1/\$258.8)^{(1/8)} - 1$.

years. Over this same timeframe, Dr. Topel's non-Fighter event costs increased by just five percent. As seen below, Zuffa's promotional expenditures actually declined over this timeframe. None of these data supports Dr. Topel's claim that non-Fighter inputs have played an increasingly more important role than Fighters in generating revenue for Zuffa.

FIGURE 1: ZUFFA'S EVENT REVENUE, NON-FIGHTER COSTS, AND PROMOTIONAL SPEND (2008 – 2016)



Source: Zuffa annual P&Ls. Non-Fighter event costs based on Dr. Topel's backup to his Supplemental Reply. Promotional costs based on promotional spend regressions in Singer Supplemental Report.

36. As explained above, consistent with standard econometric methods, my impact regression includes a time trend to control for the possibility that Zuffa's contribution to Event Revenue (through its promotional expenditures, its promotional acumen, or otherwise) has increased

over time.¹⁰⁸ Dr. Topel claims that the time trend does not adequately control for Zuffa's contribution to Event Revenue because it is the same for Zuffa bouts and for Strikeforce pre-acquisition bouts.¹⁰⁹ Dr. Topel ignores that, even when I allowed the time trend to vary between Zuffa bouts and Strikeforce pre-acquisition bouts, as I did in my Rebuttal Report,¹¹⁰ my impact regressions continue to show impact. Dr. Topel also observes that the time trend in my impact regression controls only for changes in Zuffa's contribution to Event Revenue that increase at a steady rate over time.¹¹¹ I agree that this statement is true of the time trend in my impact regression (or any time trend in any regression), which is one reason why my regression model includes more than 1,500 additional control variables. Dr. Topel makes similar observations regarding the year fixed effects (pointing out that they are fixed within a given year, and thus control for average differences across years),¹¹² and my promoter fixed effects (pointing out that they are fixed within a given promoter, and control for average differences across promoters).¹¹³ Significantly, Dr. Topel ignores the thousands of Fighter fixed effects and other fighter-specific control variables, which make up the vast majority of control variables in my impact regression. Dr. Topel does not dispute that, as explained above and in my Supplemental Report, these variables collectively control for the possibility that Zuffa's promotional activities or acumen allow it to capture incremental revenue generated by its Fighters, including its most productive Fighters.¹¹⁴

108. Singer Report ¶185; Singer Supplemental Report ¶29.

109. Topel Supplemental Reply ¶30.

110. See Backup to Singer Rebuttal Report. As before, the coefficient on the time trend is positive and significant, indicating that Zuffa's unobserved productivity has, if anything decreased over time; this indicates that, under more competitive conditions, Fighter compensation should have risen at least in proportion to Event Revenue, if not more rapidly. Singer Supplemental Report ¶29.

111. Topel Supplemental Reply ¶30.

112. *Id.* ¶31.

113. *Id.*

114. Singer Supplemental Report ¶31.

37. What Dr. Topel has failed to articulate in any of his reports is: (1) how all of my control variables *collectively* would have somehow failed to adequately control for Zuffa's promotional acumen or investments; and (2) how this hypothetical uncontrolled-for component would provide a procompetitive basis for the observed reductions in Fighters' wage share, by somehow increasing the demand for Zuffa events without a corresponding increase in the demand for Zuffa Fighters.

38. Referring to Exhibit 5 of his report, Dr. Topel observes that UFC 111 (in March of 2010) generated approximately \$28.1 million in Event Revenue; in contrast UFC Live (held a few days before) and UFC Fight Night 21 (held a few days later), each generated approximately \$3.0 million in Event Revenue.¹¹⁵ Dr. Topel presents this variation as if it were unexplained, and as if this unexplained variation somehow invalidated my regression.¹¹⁶ Given that every regression model has at least some unexplained variation (these are the "residuals" that appear in every introductory econometrics textbook),¹¹⁷ this would hardly constitute proof that my regression model is unreliable. Moreover, the variation highlighted by Dr. Topel in Exhibit 5 is *not* unexplained. That UFC 111 generated much more Event Revenue than the other two events is no great mystery: UFC 111 was a *pay-per-view event* held on a Saturday night; UFC Live and UFC Fight Night 21 were not.¹¹⁸ As Dr. Topel is (or should be) aware, PPV events feature more prominent Fighters than non-PPV events,

115. Topel Supplemental Reply ¶32; Exhibit 5.

116. *Id.* ¶32.

117. Wooldridge at 27-32.

118. Of these three March 2010 events, "UFC 111: St. Pierre vs. Hardy" was a Pay-Per-View event held in Newark, NJ, featuring two UFC championship fights: Georges St. Pierre (no. 1 ranked Welterweight) vs. Dan Hardy (no. 6 ranked Welterweight) headlining for the Welterweight title, and Frank Mir (no. 6 ranked Heavyweight) vs. Shane Carwin (no. 4 ranked Heavyweight) competing for the interim Heavyweight title. "UFC Fight Night 21: Florian vs. Gomi" was a televised event held in Charlotte, NC, featuring Kenny Florian (no. 3 ranked Lightweight) vs. Takanori Gomi (no. 18 ranked Lightweight) as headliners. "UFC LIVE: Vera vs. Jones" was a televised event held in Broomfield CO, featuring Jon Jones (no. 14 ranked LightHeavyweight) and Brandon Vera (no. 20 ranked LightHeavyweight).

and generate substantially more revenue.¹¹⁹ Moreover, as Dr. Topel should also be aware, my impact regression explicitly *controls* for differences between PPV events and non-PPV events.¹²⁰ In addition, my fighter fixed effects and other fighter-specific variables control for differences between the mix of Fighters participating in the three events, while my venue fixed effects control for differences in the prominence of the venues of the three events. Dr. Topel is therefore incorrect when he asserts that my regression “cannot account for” the differences between UFC 111 and the other two events.¹²¹ It can and it does.

39. Moreover, even if my impact regression did not control for *any* of the differences between these three events, it would not matter, because Zuffa’s foreclosure share during UFC 111 was virtually identical to its foreclosure share during the other two events (given that all three events were held within the same ten-day window). This means that my impact regression would not attribute *any* of the differences across these three events to Zuffa’s foreclosure of the relevant input market. Thus, even if it were true, as Dr. Topel implies,¹²² that Zuffa’s promotional acumen explains—to a significant degree—why it is that Zuffa earned Event Revenue of just \$3.0 million on March 21, and then \$28.1 million on March 27, and then \$3.0 million on March 31 (apparently Dr. Topel believes that Zuffa’s promotional acumen bounces up and down quite a bit within a ten-day window),¹²³ Dr. Topel still would have no basis for claiming that my foreclosure variable is somehow picking up effects that are properly attributed to Zuffa’s promotional acumen. Finally, the same is true of Ultimate Fight Night (“UFN”) USA 2 and UFC 200, the two remaining events in Dr.

119. Singer Report ¶113.

120. *Id.* ¶182.

121. Topel Supplemental Reply ¶32.

122. *Id.*

123. *Id.* Exhibit 5.

Topel's Exhibit 5: UFC 200 was a Saturday night PPV event; UFN USA 2 was not.¹²⁴ In summary, Dr. Topel's Exhibit 5 does not "demonstrate the inadequacy"¹²⁵ of my impact regressions; to the contrary, it illustrates some of the many ways in which my analysis properly controls for variation in the data.

40. Dr. Topel also claims that my regressions with promotional spend variables "cannot account for Zuffa's superior productivity in promoting and expanding its own events and MMA generally."¹²⁶ According to Dr. Topel, what is actually driving Zuffa's Event Revenue is "Zuffa's superior business acumen and *productivity* in promoting MMA events,"¹²⁷ which cannot be measured or quantified. This is pure speculation. As in Dr. Topel's past reports, he provides no evidence quantifying Zuffa's acumen or productivity; his claims are based solely on anecdotes and conjecture.¹²⁸ Moreover, as explained above, neither Dr. Topel nor Zuffa has presented any evidence of anything that Zuffa did, or could have done, that would have increased Zuffa's productivity without a corresponding increase in Fighter productivity; indeed, both the available evidence and Dr. Topel's own claims show that anything Zuffa did to enhance its own productivity would also enhance the revenue-generating ability of Zuffa's Fighters, and therefore would not decrease Fighters' wage share (in a more competitive market where Fighters are receiving compensation approaching their Marginal Revenue Product).¹²⁹ Nothing in the record or the available data

124. Specifically, "UFC 200: Tate vs. Nunes" was a Pay-Per-View event held in Las Vegas, NV, featuring two UFC championship fights: Miesha Tate (no. 1 ranked Woman's Bantamweight) vs. Amanda Nunes (no. 6 ranked Woman's Bantamweight) headlining for the Women's Bantamweight title, and Jose Aldo (no. 4 ranked Featherweight) vs. Frankie Edgar (no. 1 ranked Featherweight) competing for the Featherweight title. "UFN USA 2: Dos Anjos vs. Alvarez" was a televised event held in Las Vegas, NV, featuring Eddie Alvarez (no. 3 ranked Lightweight) vs. Rafael Dos Ajos (no. 1 ranked Lightweight) headlining for the Lightweight title.

125. Topel Supplemental Reply ¶32.

126. *Id.* ¶13.

127. *Id.* (emphasis in original).

128. Singer Rebuttal Report ¶¶228-232.

129. Singer Supplemental ¶21.

indicates that Fighters' productivity has grown at a slower rate than Zuffa's (unquantified) productivity. Finally, although Zuffa's productivity, as Dr. Topel has defined it, is inherently unobservable, it bears emphasis that my regression analysis uses standard methods to control for any unobserved factors that may influence the wage share. As explained above, these include a time trend, year fixed effects, and promoter fixed effects, along with thousands of Fighter-specific control variables.

III. THE ECONOMIC AND ECONOMETRIC CLAIMS IN ZUFFA'S OPPOSITION TO CLASS CERTIFICATION AND DR. TOPEL'S SUPPORTING DECLARATION LACK MERIT

41. Both Zuffa's Opposition to Class Certification and Dr. Topel's Supporting Declaration include various incorrect and misleading economic and econometric claims. Some are new; most are recycled. In this section, I focus on the former, the latter having been addressed in my prior reports.

42. My prior reports used standard econometric methods common to the class, which have been accepted in prior antitrust litigation, to demonstrate antitrust injury (or common impact) to the vast majority of Class Members.¹³⁰ Dr. Topel failed to rebut this proof, and instead effectively confirmed my conclusions: According to his own calculations, more than 98 percent of Class Members suffered impact.¹³¹ In his Supporting Declaration, Dr. Topel simply restates his finding, reiterating that his own calculations show that just 14 members of the Bout Class (or about 1.3 percent of the 1,056 Fighters in the Bout Class) were not impacted.¹³² As explained in my prior reports, this overstates the number of non-injured Class Members because: (1) Dr. Topel ignores Fighters that suffered injury on at least one occasion (focusing exclusively on those

130. Singer Rebuttal Report ¶¶150-152; Tables 2-3; Singer Report ¶¶230-231.

131. Singer Rebuttal Report ¶¶150-152; Tables 2-3.

132. Topel Supporting Declaration ¶27.

undercompensated on net across multiple events); and (2) Dr. Topel assumes that Zuffa's foreclosure share would remain at 30 percent in the but-for world, when it could have been lower.¹³³ In any case, regardless of whether 98 or 99 percent of Class Members were injured, these calculations simply confirm that my conclusions regarding classwide impact are robust.¹³⁴ They also demonstrate that I can easily identify exactly which Fighters were uninjured, and, if necessary, remove these Fighters from the Bout Class (or from any proposed allocation of damages) should the Court deem it appropriate.¹³⁵

43. Relatedly, Zuffa's Class Cert Opposition calculates that the same 14 Fighters account for 27 percent of the compensation paid to the Bout Class.¹³⁶ This is misleading because removing these 14 Fighters from the analysis entirely would reduce aggregate damages by a much smaller proportion (approximately four percent).¹³⁷ That is largely because removing data reflecting Fighters whom the regression finds are partially or fully uninjured (*i.e.*, did not contribute to damages) would not be expected have a substantial effect on total damages. Further, even this four percent figure is overstated, given that some of these Fighters were injured on at least one occasion,¹³⁸ while others were injured on net if the foreclosure share in the but-for world is set to 20 percent, rather than 30

133. Singer Rebuttal Report ¶¶150-152; Tables 2-3.

134. *Id.* ¶152.

135. *Id.*

136. Zuffa's Class Cert Opposition at 16.

137. *See* Backup for this report. This calculation is performed using backup materials produced in conjunction with the Singer Report.

138. Singer Rebuttal Report, Table 2.

percent.¹³⁹ After making these corrections, there are only nine uninjured Fighters;¹⁴⁰ removing them would cause aggregate damages to fall by only about two percent.¹⁴¹

44. Zuffa's Class Cert Opposition complains nonsensically that my impact regression "applies the same foreclosure share... to all athletes competing at a given point in time."¹⁴² According to Zuffa, my impact regression "says nothing about whether individual class members were impacted because it *assumes* that class members were equally foreclosed in the actual world."¹⁴³ In other words, Zuffa claims that the share of the market foreclosed should vary by Class Member. This is nonsense: The foreclosure share is the same for every Class Member, just as Zuffa's market share is the same for every Class Member. Consistent with standard economic methods, the foreclosure share measures the extent to which Zuffa's would-be rivals were foreclosed from critical inputs (in this case, a deep roster of top Fighters),¹⁴⁴ which prevented other MMA promoters from exerting competitive discipline and allowed Zuffa to suppress Fighter compensation.¹⁴⁵ Relatedly, Zuffa claims that the issue of "coercion" raises individualized issues.¹⁴⁶ It does not: From an

139. *Id.* Table 2; *see also id.* ¶152, n. 522 ("even under Dr. Topel's assumptions, Conor McGregor suffered antitrust impact in 5 events during the Class Period, and thus suffered impact if impact is understood to mean being undercompensated due to the Challenged Conduct in at least one event. If the but-for foreclosure share is 20 percent, then the impact regressions show that Conor McGregor also suffered antitrust impact on net (that is, the aggregate share of Event Revenue received by Conor McGregor across all events in the regression database during the Class Period was less than the aggregate share that he would have received in the absence of the Challenged Conduct).").

140. *Id.* Table 2.

141. *See* Backup for this report. This calculation is performed using backup materials produced in conjunction with the Singer Report.

142. Zuffa's Class Cert Opposition at 27.

143. *Id.* (emphasis in original).

144. Singer Report ¶5 ("The Challenged Conduct fits within the standard economic framework of Raising Rivals' Costs ("RRC"). Under the RRC framework, a dominant firm engages in exclusionary conduct that 'totally or partially 'forecloses' competitors from access...to critical inputs.' As a consequence, firms that would otherwise provide competitive discipline are unable to do so, allowing the dominant firm to exercise market power, resulting in anticompetitive harm." Citing Steven C. Salop, *The Raising Rivals' Cost Foreclosure Paradigm, Conditional Pricing Practices and the Flawed Incremental Price-Cost Test*, 81(2) ANTITRUST L.J. 371-421, 376 (2017)).

145. Singer Report ¶5; ¶¶156-173; ¶¶180-192.

146. Zuffa's Class Cert Opposition at 38.

economic perspective, coercion in the context of foreclosure is a market-wide concept; it refers to Zuffa's ability to induce Fighters to accept Zuffa's exclusionary terms, despite the fact that they would have been made *collectively* better off by rejecting them.¹⁴⁷

45. Zuffa claims that my impact regression "when applied to actual compensation, shows no antitrust injury."¹⁴⁸ This is false; as I have explained before, all levels-based analyses proffered by Zuffa's economists are fatally flawed, and no meaningful inferences regarding impact or damages can be drawn from them one way or the other.¹⁴⁹ Under the levels-based framework advocated by Zuffa's economists, if Zuffa's Event Revenue increased by a factor of ten, while Fighter compensation increased by only one percent, this would be falsely construed as evidence that monopsony power has not been exercised.¹⁵⁰ Dr. Topel's sole attempt to incorporate Event Revenue into his levels-based analysis is fatally flawed; it *assumes* that the Challenged Conduct had no effect on the proportion of Event Revenue paid out to Fighters as compensation, and thus assumes away the effect of the Challenged Conduct.¹⁵¹ In particular, it assumes that, if Zuffa's Event Revenue were to double (increasing by 100 percent), then *under competitive conditions*, Fighter compensation should increase by only about 8 percent.¹⁵²

46. My initial report defined the relevant geographic market as encompassing MMA events in the Relevant Output Market broadcast in North America, and explained that viewer substitution to MMA events broadcast outside of North America could not discipline a hypothetical

147. Singer Report ¶176.

148. Zuffa's Class Cert Opposition at 3.

149. Singer Rebuttal Report ¶¶111-114; Singer Supplemental Report ¶¶34-37.

150. Singer Supplemental Report ¶34.

151. Singer Rebuttal Report ¶¶115-120; Singer Supplemental Report ¶34, n. 101.

152. Singer Supplemental Report ¶¶36-37.

price increase within North America.¹⁵³ Zuffa now claims that the relevant geographic market is *narrower* than North America, asserting, “Plaintiffs lack evidence that output markets of MMA events staged at local venues are national.”¹⁵⁴ This is incorrect. All of Zuffa’s MMA events are broadcast nationwide, either on PPV or on broadcast or cable television; the vast majority of Zuffa’s revenue is not generated from local ticket sales.¹⁵⁵ The price of a UFC PPV event is uniform nationwide (currently \$54.99 for standard definition and \$64.99 for high definition).¹⁵⁶ Similarly, there is no regional variation in the pricing of the UFC’s non-PPV events to viewers, given that viewers do not pay any incremental price to view a UFC event on broadcast television or cable television. And although there is variation in the pricing of the tickets to MMA events, neither Zuffa nor Dr. Topel has produced any evidence that this variation is due to differences in regional demand (as opposed to, say, the prominence of the Fighters at the Top of the Card), or that Zuffa adjusts its ticket prices based on regional demand. Even if one were to assume counterfactually that the output market were regional, this would not upset my conclusion that Zuffa has a dominant share of the output market: If Zuffa enjoys a high market share nationwide, it must also have a high market share

153. Singer Report ¶¶120-123.

154. Zuffa’s Class Cert Opposition at 23.

155. *See, e.g.*, WME-ZUFFA-00001150 at *30 (showing, for fiscal year 2015, Zuffa’s live event revenue totaling \$76 million, or about 12 percent of Zuffa’s total revenue of \$609 million).

156. *See* <https://www.ufc.tv/events>. *See also* Topel Report ¶248 (Stating that Zuffa increased their PPV price “from \$45 to \$50, in 2015”); Singer Report ¶199, n. 491 (citing ZFL-2530042 at 50 (June 2015 UFC Board Update Presentation: “\$5 [PPV] price increase in the U.S., which was introduced with the January 3rd UFC 182 event, does not appear to have negatively impacted buy rates.”); ZFL-1063442 (“We are modeling \$5 SRP increases in 2015 and 2018. The \$5 [PPV] increase in 2015 is long overdue as we haven’t raised prices since 2006. We are not particularly concerned with price sensitivity as we experimented with a one-time price increase with UFC 168 and still generated the highest buys of 2013); ZFL-1073120 (“On January 3, [2015] UFC 182, Jones v. Cormier, we introduced a \$5 [PPV] price increase in the U.S. which was met with little to no discernable pushback.”).

in some (if not all) regional markets. In any case, the question of whether the Relevant Geographic Market is national or regional is common to the Class.

47. In his Supporting Declaration, Dr. Topel devotes significant space to the claim that “[j]ust as the price paid by consumers is the proper metric for evaluating anticompetitive impact and harm in a monopoly case, actual compensation... is the proper metric in a monopsony case.”¹⁵⁷ This claim is specious. Evaluating Fighter compensation while ignoring the revenues that Fighters generate would be analogous to evaluating the prices paid by consumers for a firm’s output while ignoring the marginal cost to the firm of producing that output. That prices have fallen by one percent does not necessarily imply that consumers have escaped anticompetitive harm from a monopolist, particularly if costs have fallen by (say) fifty percent. Similarly, that compensation has increased over time does not necessarily imply that workers have escaped anticompetitive harm from a monopsonist, particularly when revenue has increased far more than worker pay over time, as is the case here.¹⁵⁸

48. In Dr. Topel’s initial report, he presented a simple economic model purporting to demonstrate how, in theory, Fighters’ wage share could decline as a result of Zuffa increasing its promotional activities. In contrast to Zuffa’s and Dr. Topel’s new claims, that economic model assumed—quite logically—that Zuffa’s promotional activities *do* increase the demand for Zuffa’s Fighters.¹⁵⁹ As I explained in my Rebuttal Report, Dr. Topel’s theoretical exercise in his initial Report is fatally flawed, and relies on extreme and inapplicable assumptions. That Dr. Topel was forced to resort to these extreme and unrealistic assumptions merely demonstrates how implausible

157. Topel’s Supporting Declaration ¶20.

158. Singer Rebuttal Report ¶39; *see also* Singer Supplemental Report, Figure A1 (showing Zuffa’s Event Revenue over time).

159. Topel Report ¶¶308-315.

it is that Zuffa's promotional expenditures provide an alternative procompetitive explanation for Fighters' falling wage share.¹⁶⁰ None of Dr. Topel's subsequent reports has attempted to resuscitate his model by responding to my critiques in any way (or to provide any empirical basis for Dr. Topel's purely theoretical exercise). In Dr. Topel's Supporting Declaration, he restates the conclusions of his flawed model, again without attempting to address any of my critiques or offer any empirical support.¹⁶¹ Dr. Topel's model remains incorrect for the same reasons given in my Rebuttal Report. *First*, it unrealistically assumes an effectively limitless supply of perfectly interchangeable Fighters. In other words, Dr. Topel assumes that Fighters are a commodity, like office supplies. This assumption is inapplicable to MMA Fighters, which are not commodities, but highly trained athletes, with widely varying attributes, skill levels, and revenue-generating potential; it is also tantamount to assuming that Zuffa is powerless to set Fighter compensation (that is, it has no monopsony power at all),¹⁶² a position in conflict with the overwhelming evidence, as I explain above. *Second*, and relatedly, Dr. Topel's assumption engineers the result that Fighter compensation will never increase, regardless of how much additional revenue Zuffa earns from Fighters.¹⁶³ *Third*, his assumption cannot explain why Zuffa would enter into long-term exclusive contracts with (fungible) Fighters.¹⁶⁴

160. Singer Rebuttal Report ¶¶139-143.

161. Topel's Supporting Declaration ¶20.

162. Singer Rebuttal Report ¶140.

163. *Id.* ¶141.

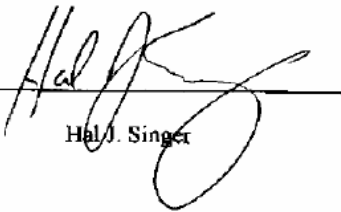
164. *Id.* ¶142.

Fourth, his assumption is refuted by the results of Dr. Topel's own regression model, by his own admissions, by Zuffa's own statements, and by Dr. Oyer's testimony.¹⁶⁵

CONCLUSION

49. For the foregoing reasons, having carefully reviewed Dr. Topel's and Zuffa's newest arguments and analyses, I am not persuaded to revise any of my prior opinions.

* * *



Hal J. Singer

Executed on May 28, 2018.

165. Singer Rebuttal Report ¶143. *See also* Oyer Dep. at 85:6-13 (admitting Fighters are not fungible).

APPENDIX: TABLES

TABLE A1: TOPEL SUPPLEMENTAL REPORT, EXHIBIT 2, CORRECTED

	Singer Original Regression (Singer Report, Table 6)			Topel Non-Fighter Cost Regression "Missing" Event Data Included		
Explanatory Variable	Dependent Variable: Fighter Share			Dependent Variable: Fighter Share		
	Tracked Market	Ranked Market	Headliner Market	Tracked Market	Ranked Market	Headliner Market
<i>Foreclosure Share</i>	-0.0329** (0.0434)	-0.0427** (0.0317)	-0.0319** (0.0462)	-0.0300* (0.0717)	-0.0380* (0.0647)	-0.0292* (0.0747)
<i>ln</i> (Event Costs - Event Fighter Comp)				-0.00707*** (2.44e-07)	-0.00702*** (6.23e-07)	-0.00710*** (1.72e-07)
<i>Constant</i>	-0.131** (0.0493)	-0.185** (0.0212)	-0.133** (0.0487)	-0.0744 (0.294)	-0.122 (0.162)	-0.0760 (0.289)
Restricted to Zuffa Events?	No	No	No	No	No	No
Fighter Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,154	7,154	7,154	7,154	7,154	7,154
R-Squared	0.365	0.364	0.365	0.370	0.369	0.370

	Topel Non-Fighter Cost Regression Excluding All Strikeforce Pre- Acquisition Bouts			Topel Non-Fighter Cost Regression "Missing" Event Data Included; Correct Fighter Comp Data Used		
Explanatory Variable	Dependent Variable: Fighter Share			Dependent Variable: Fighter Share		
	Tracked Market	Ranked Market	Headliner Market	Tracked Market	Ranked Market	Headliner Market
<i>Foreclosure Share</i>	-0.0282** (0.0319)	-0.0192** (0.0122)	-0.0222 (0.103)	-0.0309* (0.0591)	-0.0390* (0.0531)	-0.0300* (0.0622)
<i>Log</i> (Event Costs - Event Fighter Comp)	-0.00839*** (0)	-0.00824*** (0)	-0.00840*** (0)	-0.00717*** (2.61e-09)	-0.00705*** (1.54e-08)	-0.00719*** (2.04e-09)
<i>Constant</i>	-0.0371 (0.484)	-0.0379 (0.495)	-0.0286 (0.586)	-0.0772 (0.259)	-0.126 (0.132)	-0.0789 (0.254)
Restricted to Zuffa Events?	Yes	Yes	Yes	No	No	No
Fighter Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,942	6,942	6,942	7,154	7,154	7,154
R-Squared	0.406	0.406	0.406	0.370	0.369	0.370

Notes: Robust p-values in parentheses. *** p<0.01, ** p<0.05, * p < 0.10 These regressions include the same control variables as the original impact regressions reported in Table 6 of my initial report. The "missing" event cost data for Topel's 87 dropped observations are re-added from ZFL-2458186, which provided in the original Singer Backup. Actual Fighter compensation (see SR1, Appendix) from Zuffa used instead of event P&L total compensation.

Sources: Topel Report 4 Backup, Singer Backup

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TABLE A2: TOPEL SUPPLEMENTAL REPLY EXHIBIT 1 WITH FIGHTER EVENT COSTS

	Singer Promotional Costs	Event Promotional Costs	Event Production Costs	Other Event Costs	Total Non-Fighter Event Costs	Fighter Event Costs
2008	\$684,182	\$614,358	\$1,817,173	\$694,789	\$3,126,320	\$1,969,714
2009	\$833,238	\$651,786	\$1,842,471	\$745,671	\$3,239,928	\$2,216,494
2010	\$1,067,276	\$837,187	\$1,875,276	\$811,427	\$3,523,889	\$2,682,377
2011	\$813,061	\$621,714	\$1,563,525	\$810,146	\$2,995,385	\$2,085,625
2012	\$1,302,717	\$1,061,282	\$2,639,942	\$1,001,358	\$4,702,582	\$1,892,604
2013	\$1,704,684	\$1,329,556	\$2,381,064	\$1,114,752	\$4,825,372	\$2,608,992
2014	\$1,331,081	\$799,334	\$2,287,983	\$944,681	\$4,031,998	\$1,465,528
2015	\$2,133,324	\$1,294,492	\$2,290,889	\$1,101,584	\$4,686,965	\$2,507,770
2016	\$1,103,507	\$1,046,824	\$1,786,527	\$1,879,393	\$4,712,744	\$3,438,525

Notes:

- [1] Costs are in 2016 dollars, deflated using the CPI-U.
- [2] The Singer Promotional Expenses include all Zuffa and Strikeforce expenses classified as promotional expenses by Dr. Singer. This includes expenses unrelated to PPV, Televised and Live Events.
- [3] Zuffa P&Ls are organized differently in 2008-2013 than in 2014-2015 and in 2016.
- [4] Zuffa Event Promotional Costs include the following line items:
[a] From the "PPV Expenses" and "Live/Tape Delay TV Expenses" sections of their 2008-2013 P&Ls: Ticket Advertising, Other Ad/Broadcast Costs, Broadcast Advertising, PPV Advertising, Promotional/Giveaways, Event Related Promotions, Closed Circuit Advertising and Branding.
[b] From the "Content Expense" and "Live Events Expense" sections of their 2014-2015 P&Ls: any of the line items in 4[a], if applicable, as well as Fox Advertising Gross Up and Other/Digital Advertising.
[c] From the "Content Expense" and "Live Events Expense" sections of their 2016 P&Ls: any of the line items in 4[a]-[b], if applicable, as well as Commercial PPV Marketing, Commercial PPV-COOP Marketing, COOP Marketing, Digital Marketing, Event Branding, Event Promos, International Brand Marketing, Other Branding, Outdoor Marketing, PPV Contractual Marketing, Print Marketing, Radio Marketing, Retail Marketing, Social Media Marketing, Television Marketing, Third Party Ticket Marketing, and Venue Ticket Marketing.
- [5] Zuffa Event Production costs include the following line items:
[a] From the "PPV Expenses" and "Live/Tape Delay TV Expenses" sections of their 2008-2013 P&Ls: Graphics, Graphics, Posters, & Art, Set Design & Construction, Contract Production, Non-Contract Production, Equipment Rental, Video Production Costs, Announcers, and Signal Insurance.
[b] From the "Content Expense" and "Live Events Expense" sections of their 2014-2015 P&Ls: any of the line items in 5[a], if applicable, as well as Production - Events.
[c] From the "Content Expense" and "Live Events Expense" sections of their 2016 P&Ls: any of the line items in 5[a]-[b], if applicable, as well as Audio Production, Other Production Costs, Production Stats, and Ultimate Fighter Production.
- [6] Other Zuffa Event Costs include the following line items:
[a] From the "PPV Expenses" and "Live/Tape Delay TV Expenses" sections of their 2008-2013 P&Ls: all line items except for those classified as Event Promotional Costs, Event Production Costs, and line items related to athlete compensation (Fighter Purse, Fighter Bonus, Fighter Sponsorship, LOA Payment, and Other Fighter Costs).
[b] From the "Content Expense" and "Live Events Expense" sections of their 2014-2015 P&Ls: all line items except for those classified as Event Promotional Costs, Event Production Costs, and line items related to athlete compensation (any of the line items in 6[a], if applicable, as well as Fighter Comp, Referees, Medical, Athlete Bonus, Athlete Purse, and Athlete Purse-LOA). Also excludes line items not included in prior year "PPV Expenses" and "Live/Tape Delay TV Expenses" that do not appear to be event-related.
[c] From the "Content Expense" and "Live Events Expense" sections of their 2016 P&Ls: all line items except for those classified as Event Promotional Costs, Event Production Costs, and line items related to athlete compensation (any of the line items in 6[a]-[b], if applicable, as well as Athlete Adjustments, Fighter Bonus-Disc, Fighter Bonus-FON, Fighter Bonus-PPV, Fighter Bonus-Signing, Fighter Purse-Show, and Fighter Purse-Win). Also excludes line items not included in prior year "PPV Expenses" and "Live/Tape Delay TV Expenses" that do not appear to be event-related.

Sources:

- [1] Zuffa Promotion Tables_CKD.xlsx (Singer Supplemental Report Backup)
- [2] Sherdog Denom for Market Shares.dta (Singer Backup)

APPENDIX: MATERIALS RELIED UPON

Deposition of Alan Manning, February 8, 2018

Deposition of Paul Oyer, November 29, 2017

Deposition of Robert Topel, December 5-December 6, 2017

Expert Report of Hal J. Singer, Ph. D., Cung Le, et al., v. Zuffa, LLC d/b/a Ultimate Fighting Championship and UFC, Case No. 2:15-cv-01045-RFB-PAL (D.Nev.) (August 31, 2017)

Expert Report of Paul Oyer, Cung Le, et al., v. Zuffa, LLC d/b/a Ultimate Fighting Championship and UFC, Case No. 2:15-cv-01045-RFB-PAL (D.Nev.) (October 27, 2017)

Expert Report of Professor Robert H. Topel, Cung Le, et al., v. Zuffa, LLC d/b/a Ultimate Fighting Championship and UFC, Case No. 2:15-cv-01045-RFB-PAL (D.Nev.) (October 27, 2017)

Expert Rebuttal Report of Alan Manning, Cung Le, et al., v. Zuffa, LLC d/b/a Ultimate Fighting Championship and UFC, Case No. 2:15-cv-01045-RFB-PAL (D.Nev.) (January 12, 2018)

Letter from Marcy Norwood Lynch to Daniel Silverman (July 17, 2017)

Professor Robert Topel's Reply to the Supplemental Expert Report of Hal J. Singer, PhD., Cung Le, et al., v. Zuffa, LLC d/b/a Ultimate Fighting Championship and UFC, Case No. 2:15-cv-01045-RFB-PAL (D.Nev.) (May 7, 2018)

Rebuttal Expert Report of Hal J. Singer, Ph.D., Cung Le, et al., v. Zuffa, LLC d/b/a Ultimate Fighting Championship and UFC, Case No. 2:15-cv-01045-RFB-PAL (D.Nev.) (January 12, 2018)

Sur-Rebuttal Expert Report of Hal J. Singer, Ph.D., Cung Le, et al., v. Zuffa, LLC d/b/a Ultimate Fighting Championship and UFC, Case No. 2:15-cv-01045-RFB-PAL (D.Nev.) (April 3, 2018)

Sur-Rebuttal Expert Report of Professor Robert H. Topel, Cung Le, et al., v. Zuffa, LLC d/b/a Ultimate Fighting Championship and UFC, Case No. 2:15-cv-01045-RFB-PAL (D.Nev.) (February 12, 2018)

LITERATURE

Hal Singer & Kevin Caves, Applied Econometrics: When Can an Omitted Variable Invalidate a Regression?, Antitrust Source (Dec. 2017).

Richard McGowan & John Mahon, Demand for the Ultimate Fighting Championship: An Econometric Analysis of PPV Buy Rates, 6(6) JOURNAL OF BUSINESS AND ECONOMICS 1032-1056, (2015)

Steven C. Salop, The Raising Rivals' Cost Foreclosure Paradigm, Conditional Pricing Practices and the Flawed Incremental Price-Cost Test, 81(2) Antitrust Law Journal 371-421, 374 (2017)

Jeffrey Wooldridge, Introductory Econometrics: A Modern Approach (Thompson 4th ed. 2009)

TRIAL MATERIALS/BATES DOCUMENTS

Declaration of Professor Robert H. Topel in Support of Zuffa, LLC's Opposition to Plaintiffs' Motion for Class Certification (April 6, 2018)

WME-ZUFFA-00001150

ZFL-1063442

ZFL-1073120

ZFL-2458186

ZFL-2530042

Zuffa, LLC's Motion to Exclude the Testimony of Dr. Hal Singer under Fed. R. Evid. 702 and Daubert, Cung Le, et al., v. Zuffa, LLC d/b/a Ultimate Fighting Championship and UFC, Case No. 2:15-cv-01045-RFB-PAL (D.Nev.) (February 16, 2018)

Zuffa, LLC's Opposition to Plaintiffs' Motion for Class Certification (April 6, 2018)

PUBLICLY AVAILABLE MATERIALS

Ultimate Fighting Championship, UFC Pay-Per-View, at <http://www.ufc.com/events/>